

Chino Mines Company
Box 7
210 Cortez Avenue
Hurley, NM 88043

January 21, 2008

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Via Certified Mail #70041160000109409165

Return Receipt Requested

Mr. Jon Goldstein
Deputy Secretary
New Mexico Environment Department
Water and Waste Management Division
P.O. Box 26110
Santa Fe, New Mexico 87502

Dear Mr. Goldstein:

Re: Revised Remedial Investigation Report
Smelter/Tailing Soils Investigation Unit – Chino AOC

Submitted under separate cover are responses to comments on the revised December 2006 Remedial Investigation (RI) Report for the Smelter/Tailing Soil Investigation Units (STIU) under the Chino Administrative Order on Consent. The New Mexico Environmental Department (NMED) in a letter dated November 13, 2007 to Chino Mines Company (Chino) commented on the RI Report. Chino's response letter to the comments was submitted today to Mr. Phil Harrigan. The report is being revised in response to the NMED comments and will be submitted February 6, 2008.

Please contact Ms. Pamela Pinson at (505) 537-4213 if you have any questions regarding this response document and the RI report.

Sincerely,



Timothy E. Eastep, Manager
Environmental, Land and Water

TEE:pp
20080121-001

c: Messrs: Phil Harrigan, NMED
Jerry Schoeppner, NMED
Mark Purcell, EPA



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**Response to NMED Comments
Smelter/Tailing Soils Remedial Investigation Report**

January 21, 2008

This document presents Chino Mines Company's (Chino's) response to comments from the New Mexico Environment Department (NMED) on the Remedial Investigation Report (RI Report) for the Smelter/Tailing Soils Investigation Unit (S/TSIU). The comments were received from the NMED in a letter dated November 13, 2007. The RI Report was prepared in accordance with the Scope of Work associated with the Administrative Order on Consent (AOC) between Chino and the NMED. The RI Report is being revised to incorporate new language to address the NMED comments, and will be submitted February 6, 2008.

A number of comments pertained to the presentation of univariate statistics in the S/TSIU RI Report. Specifically, discrepancies between the data analysis presented in the Human Health Risk Assessment and the univariate data analyses presented in the RI Report were noted. Based on consultation with the NMED, Chino elected to remove univariate statistical summaries from the RI Report because the human health and ecological risk assessments provide detailed statistical analyses based on specific exposure assumptions.

In addition, NMED requested clarification on the presentation of soil sampling results in terms of "within Exposure Area 4" and "outside of Exposure Area 4". SRK revised the description of soil sampling results (e.g., minimum, maximum and median values) to encompass all samples collected. The RI Report also defines a "Spatial Analysis Area" which includes soil sample results that exhibit a strong correlation of decreasing concentration with increasing distance from the former smelter operational area. Further discussion on the samples included in the Spatial Analysis Area is presented in the responses to Comments 13 and 19.

This document is organized to present a response to each comment received from NMED. Comments are reproduced in the same format as received from NMED.

RESPONSE TO GENERAL COMMENTS

Comment No. 1:

The EPA Region 6 human health medium-specific screening levels, referenced in the document for residential soils, are outdated and need to be revised. Please update Tables 4-19 and 4-21 with current MSSSLs, including values for dermal contact and inhalation (EPA GC-2).

Chino Response:

The screening levels presented in the December 22, 2006 RI Report were updated with the December 4, 2007, values available from EPA Region 6.

Comment No. 2:

The document does not clearly distinguish the reference area or the reference data collected as part of the RI. Please provide a discussion of the reference area, including but not limited to, where it is located and results from sampling (EPA GC-3).

Chino Response:

In accordance with the NMED-approved S/TSIU RI Proposal (July 2004), RI sampling of surface soil with the S/TSIU did not include reference areas. Figure 3-5 presents reference samples for the S/TSIU presented in the 1995 Background Report. The HSIU RI Report presents the results of reference area sampling for similar soil types and similar constituent sources. Additional reference areas sampling for 0-6" soil depths are provided in the Ecological Risk Assessment (NewFields, 2006).

Comment No. 3:

Please use EPA "SSLs" instead of "decision criteria" throughout the document.

Chino Response:

As per the telephone discussion between the NMED and SRK on January 10, 2008, reference to the specific SSLs will be made whenever appropriate. The term "decision criteria" will continue to be used as a generic reference.

RESPONSE TO SPECIFIC NMED COMMENTS**Comment No. 4:**

Executive Summary, page i: please revise the second sentence of the third paragraph to read "The Site-wide Ecological Risk Assessment was completed by NewFields, LLC, a NMED supervised contractor, in February 2006." Also, revise the next sentence to read "New data from this RI will be incorporated with the pertinent data and results from the Site-wide Ecological Risk Assessment (NewFields 2006) to produce the S/TSIU Ecological Risk Assessment."

Chino Response:

This change was made as requested.

Comment No. 5:

Executive Summary, Conceptual Site Model Validation, page ii: please update this Section to indicate the demolition of the smelter.

Chino Response:

The following text was added at the end of the first paragraph of that section: "The smelter area was demolished during 2007 as part of the closure activities performed under Discharge Permit 1340."

Comment No. 6:

Section 1.2, AOC Requirements page 1-2: revise the third sentence of this Section to read "The Site-wide Ecological Risk Assessment was completed by NewFields, LLC, a NMED supervised contractor, in February 2006."

Chino Response:

The change was made as requested.

Comment No. 7:

Section 3.0, REMEDIAL INVESTIGATION APPROACH, page 3-1: the first paragraph refers to Table 3.1 but that table does not reflect the sentence topic. Also, second paragraph refers to Figure 3-1, but no figure could be found in the hard copy or the CD copy. Please revise the first paragraph and add the missing figure to the document.

Chino Response:

The correct table number is Table 1-1. Figure 3-1 was added to the document.

Comment No. 8:

Section 3.1.2, Description of the Data Quality Objective Process, page 3-2: the paragraph refers to Figure 3-2 but no figure could be found in the hard copy or the CD copy. Please add the missing figure to the document.

Chino Response:

Figure 3-2 was added to the document.

Comment No. 9:

Section 3.2, Conceptual Site Model, page 3-5: the paragraph refers to Figure 3-3 but no figure could be found in the hard copy or the CD copy. Please add the missing figure to the document.

Chino Response:

Figure 3-3 was added to the document.

Comment No. 10:

Section 3.2, Conceptual Site Model, page 3-5: please revise this Section to include a discussion regarding the ecological conceptual site model.

Chino Response:

The following summary of the ecological conceptual site model was added to Section 3.2:

"A Site-Wide ERA was performed by NewFields (2006). The conceptual site model for exposure of ecological receptors identified primary sources from smelter emissions, tailing/solid mine waste stockpiles, and process waters. Releases could have occurred as dryfall, windblown, runoff, infiltration, percolation, leaks and spills. Secondary sources were identified as historic air emissions and soils to upland and grassland areas; and sediment, surface water and groundwater to ephemeral drainages. The endpoints can be generally grouped as vegetation, wildlife, and amphibian/aquatic receptors."

Comment No. 11:

Section 3.2, Conceptual Site Model, page 3-6: the paragraph beginning "Gradient, the NMED's" is incomplete.

Chino Response:

The sentence was revised to include the text: "...Table 3-1."

Comment No. 12:

Section 3.3.1.1, Surface Soil: please add a discussion on ecological pathways.

Chino Response:

The following text was added at the end of the first paragraph:

"The Site-Wide ERA (NewFields, 2006) identified potential vegetation, wildlife, and aquatic receptors. The wildlife receptors analyzed included herbivorous, insectivorous and omnivorous birds; raptors, herbivorous, granivorous and omnivorous small mammals; and mammalian predators."

Comment No. 13:

Section 3.3.1.1, Surface Soil, Surface Soil Sampling Locations within and outside of EA4: the first paragraph refers to Figure 3-5, but should refer to Figure 3-4. Please revise the text.

Chino Response:

The RI report was modified to eliminate the identification of datasets as belonging to either inside EA4 or outside EA4. Rather, the data are viewed as a single set within which there is a subset of surface soil samples designed for and applied to the spatial analysis. This fundamental change in data presentation will result in a partial re-organization of Section 4 of the RI. The Exposure Area boundaries now shown on Figure 3-5 are for informational purposes related to the HHRA.

Comment No. 14:

Section 3.3.1.2, Surface Water, Sample Preparation and Analyses, page 3-14: the 3 bullets at the end of the section do not include the 8 samples collected in 2004. Please add a note to clarify.

Chino Response:

The text was clarified as requested.

Comment No. 15:

Section 3.3.1.3, Sediment, page 3-14: the CSM presented in the Sitewide ERA (NewFields 2006) indicated that sediments were a potential source of exposure and risk to aquatic receptors in the S/TSIU. Please include the potential for exposure to sediments by ecological receptors in the introductory paragraph of this Section.

Chino Response:

The paragraph was modified to include the potential for exposure and risk to ecological receptors.

Comment No. 16:

Section 3.3.2.2, Railroad Transect Surface Soil Samples, page 3-21: the fourth paragraph of this section states that Sample S64 is listed on Table 3-3 which it is not, nor are samples S1 – S71. Please revise the Table to include these samples.

Chino Response:

Samples S1 – S71 were added to Table 3-3.

Comment No. 17:

Section 3.3.2.3, Shallow Soil East of the Tailing Impoundments, page 3-21: please change the reference of (MFG, 2005) to (NewFields, 2006) in the first sentence of this Section.

Chino Response:

The reference was changed as requested.

Comment No. 18:

Section 4.2.1, Correlation Analysis, page 4-6:

- a. Please revise the second paragraph on page 4-6, listing the number of samples in the dataset used for the correlation analysis, and the sample depth in inches.

Chino Response:

The paragraph was revised as requested.

- b. Please revise the third paragraph to be consistent with Table 4-3, assuming this table correctly reflects the data used in each test. Table 4-3 states the linear correlation was done on the log-transformed data, and the Spearman Rank correlation was done on the non-transformed data, yet the text on page 4-6 states the opposite.

Chino Response:

The text was modified to be consistent with Table 4-3.

- c. Please revise Table 4-3 listing the number of samples in the dataset used for the correlation analysis. Also, add a discussion why samples S59-S96 were not used as part of the dataset.

Chino Response:

Table 4-3 was revised to list the number of samples in the dataset used for the correlation analysis.

Analytical data from soil samples S59 through S63 indicate elevated constituent concentrations within the historic operational area of the smelter. This data set was collected to characterize the historic source for the Hurley Soils IU. These data correlate to former material handling areas which will be subject to reclamation under MMD and NMED standards. Therefore, these data are not representative of current or future residential exposure because remediation will take place under DP-1340 before any future change in property use. Contours shown in Figure 4-16 represent comparable data points for current or future residential exposure areas. Data values for soil samples S59 through S63 will be posted on the figure; however, additional contouring to include these data points is inappropriate. Therefore, constituent data within the historic smelter operational area will be posted and contour shading will be modified to minimize potential for incorrect interpretation.

Comment No. 19:

Section 4.2.2, Contour Map Development, page 4-6:

- a. Please revise the first paragraph under 4.2.2 listing the sample depths used in the kriging analysis.

Chino Response:

The text was edited to indicate that sample depths were 0 to 1 inch."

- b. This Section states that 160 samples were used in the geostatistical analysis, yet Table 4-4 lists 202 samples. Please revise Table 4-4 to list the number of samples in each of the four datasets on this and total number of samples used in the geostatistical analysis, and show that this equals 160 total samples.

Chino Response:

The table shows that 171 surface soil samples were collected from depths of 0 to 1 inches below ground surface, of which 121 were applied to the geostatistical analysis. The totals of each of the four datasets that make up the 171 samples are now shown at the bottom of the table.

- c. Figures 4-12 to 4-21 show the contour maps that were developed based on the geostatistical analysis. Please add a note on these figures listing how many sample points are plotted. Also add a note describing if the kriging covers a broader area than what is shown on these figures.

Chino Response:

Explanatory notes were added to the figures as requested.

- d. Table 4-7 lists 61 samples inside EA4 and Table 4-9 lists 69 samples outside EA4 which together total 130 samples. Please account for the other 30 samples and revise Table 4-9 to include them if appropriate. Also, please revise the report to better account for the number of samples in each data set being discussed.

Chino Response:

All soil samples collected are now discussed in the appropriate text and tables. As noted in the response to Comment No. 13, the RI report was modified to eliminate the identification of datasets as belonging to either inside EA4 or outside EA4. Rather, the data are viewed as a single set within which there is a subset of surface soil samples designed for and applied to the spatial analysis. A total of 121 surface soil samples were subject to geostatistical analyses. Of the constituents analyzed, 7 produced valid spatial models: copper, cadmium, molybdenum, lead, arsenic, manganese, and zinc. Other constituents analyzed are presented as measured point values for each composite sample location.

Comment No. 20:

Section 4.2.2., Contour Map Development, page 4-6: Please provide a discussion on the rationale for presenting separate discussion and statistical analyses for inside and outside EA 4. The report shall present conclusions regarding the relative concentrations inside and outside EA 4, and whether the RI data support the shape and size of EA 4.

Chino Response:

The NMED and Chino determined on January 7, 2008 that univariate statistics and calculations would be removed from the Revised S/TSIU RI report. Univariate statistics based upon specific exposure assumptions are detailed in the human health and ecological risk assessments. Providing the statistics in the RI Report would be redundant and subject to inconsistencies in sample sets and calculation methods with the ongoing Human Health Risk Assessment. To eliminate this source of potential confusion, the columns of univariate statistics were removed from results tables in the RI Report. Specifically, Arithmetic Mean, UCL Mean + 2sd, Geometric Mean, and 95th Percentile were removed. The summary descriptive statistics of minimum, maximum, median, sample set size, and percent detected are presented in the tables, as appropriate.

The discussion and figures showing the conceptual site model and exposure areas are not changed in the RI report, and the NMED review comments to enhance or correct the text were addressed as requested. The spatial statistics and contour maps will not change while incorporating the NMED review comments.

Comment No. 21:

Section 4.2.2., Contour Map Development, page 4-7: Last paragraph, first sentence states "Although concentrations of cadmium, copper...exhibit spatial properties best suited for geostatistical analysis, the variograms for these analytes and the others tested exhibit high variance...and only cadmium and copper indicate spatial correlation of variance." The basis for this sentence is unclear (e.g., what are the "spatial properties" exhibited?). Do the other elements or concentrations not exhibit these properties? What are the implications of the lack of spatial correlation for any conclusions based on the kriged contours? Please provide clarification.

Chino Response:

There are two spatial properties that characterize regionalized variables: drift and variance. Drift constitutes a regional trend in the value of a regionalized variable. Within the Smelter Geostatistical Analysis Area, drift manifests itself in the form of a NW-SE trending plume. It is the result of mechanisms associated with the historic transport and deposition of fugitive dust and stack emissions. Variance comprises the "noise" in the data. It is probably related to weathering processes that transport suspended and dissolved constituents and to the variability in soil properties.

Ideally, drift should be removed from the data (or incorporated as part of the spatial model) through the use of universal kriging. Ordinary kriging was used for this analysis

because preliminary attempts at universal kriging failed to produce useable spatial models. It is likely that the variance within the search radius masked the effects of drift.

The variograms provided in Appendix F depict variance as a function of distance. It is important to note that it was not possible to separate drift from variance. All constituents except copper exhibit strong spatial correlation of variance over the entire range of distances. The apparent correlation at large separations probably reflects regional drift. The variogram for copper indicates that variance is high relative to that of the other constituents.

Comment No. 22:

Section 4.2.3, Surface Soil Sampling Results within Exposure Area 4, page 4-8: as written in the third paragraph the "Upper Confidence Level" (UCL) is defined (in the RI) as the arithmetic mean plus 2 standard deviations (AM + 2SD). Please provide the parameter for which this is the upper confidence level. This is not the correct definition of the 95% upper confidence limit on the mean (95UCL) that is used in risk assessment. The statistical descriptor called "UCL" in this RI has no particular meaning for lognormal datasets, and is inconsistent with the term "UCL" that is used in the risk assessment. In a dataset that is perfectly normally distributed, approximately 95% of the data will be contained in the interval given by $AM \pm 2SD$. Therefore, in a normally distributed dataset, the value (AM + 2SD) will be located at approximately the 97.5th percentile, and the value (AM - 2SD) will be located at approximately the 2.5th percentile. However, Appendix F implies that nearly all the datasets are lognormal, and lognormal datasets are generally skewed. Therefore, the value given by (AM + 2SD) does not refer to any particular percentile in these datasets, and the term "UCL", as it is defined here, should be removed from RI report entirely. Please revise the document as appropriate.

Chino Response:

Per the response to Comment 20, univariate statistics were removed from the document.

Comment No. 23:

Section 4.2.3, Surface Soil Sampling Results within Exposure Area 4, page 4-9, third paragraph: The comparison between the "UCL" and the 95th percentile is not a valid comparison and should be removed. In a dataset with a perfect normal distribution, the value given by (AM + 2SD) will be located at approximately the 97.5th percentile, therefore, the 95th percentile would always be lower than (AM + 2SD). However, the datasets are lognormal, therefore, this comparison has no meaning and in any case is not a valid method to test for the potential presence of outliers. The potential presence of outliers should be evaluated with the box plots for each element shown in Appendix F. Please revise the document as appropriate.

Chino Response:

Per the response to Comment 20, univariate statistics were removed from the document.

Comment No. 24:

Section 4.2.3, Surface Soil Sampling Results within Exposure Area 4, page 4-9, 3rd paragraph:

General Chino Response:

Sections 4.2.3 and 4.2.4 were combined to eliminate the discussion of "Inside EA 4" and "Outside EA 4". The combine section is now titled "Surface Soil Sampling Results".

- a. Please provide the details and results of the Rosner test for outliers that should be presented in an Appendix.

Chino Response:

Though univariate statistics were removed from the document, a statistical assessment for outliers was conducted as part of the spatial analysis. This analysis is presented in Appendix F. One data point was censored for statistical reasons. Shallow soil sample S50 was noted in the cross-validation tests to have assay values that consistently deviated from kriged values by more than 5 standard-deviation units. The only exception was the cross validation of the manganese spatial model. A nearby point, U04-1004, did not display such dramatic deviation from kriged values, and its assay values consistently agreed with kriged estimates.

Sample S50 was eliminated from subsequent analyses, not only because geostatistics indicated that it was an outlier, but also because there was physical evidence to suggest that it was not representative of impacted soils in the area. This sample was collected at a time when tailings were being transported by truck from the tailings site. It was collected at a location (near the haul road) that received considerable amounts of fugitive dust from that operation.

- b. Table 4-7 does not describe or present information about outliers, thus the reference to this table should be removed.

Chino Response:

The text was modified as suggested.

- c. The section discusses 58 samples yet Table 4-7 states there are 61 samples within EA 4? The Rosner test should be done on the 61 sample dataset. Please revise as appropriate

Chino Response:

Per the response to Comment 13, soil sample data are now combined without reference to a specific exposure area. Further, univariate statistics for the combined data set were removed from the document. The data included in the spatial analysis were analyzed using univariate statistical analysis to assess the applicability of those data for kriging. Evaluations for normality and outliers are presented in Appendix F.

- d. The last sentence is unclear; are there two outliers for both chromium and vanadium? Please revise as appropriate.

Chino Response:

The evaluation of outliers was the Rosner Test as part of the univariate statistical analysis. With the removal of that analysis from the document, the evaluation of

outliers is presented for the data used in the spatial analysis. In that analysis, outliers are identified through the validation process wherein actual values are compared to kriged values. Concentrations of a constituent with large disparities in that comparison may be viewed as outliers. That comparison shows the results for the COCs in surface soil sample S50 to be up to 5 standard deviations different than the kriged values. As a consequence, concentrations for COCs in sample S50 were not used in developing the variogram models.

- e. Please add a discussion on SSLs for dermal and inhalation.

Chino Response:

A discussion of the SSLs for dermal and inhalation was added to the first paragraph of Section 4.2.3.

Comment No. 25:

Section 4.2.3.1 Arsenic within Exposure Area 4, page 4-10, third paragraph: this section refers to sample S53 on Figure 4-1, but that sample is not labeled on Figure 4-1. Please revise this section to refer to Figure 4-12 or annotate Figure 4-1.

Chino Response:

The correct reference figure is 4-12. Text was revised accordingly.

Comment No. 26:

Section 4.2.3.1 Arsenic within Exposure Area 4, page 4-10, third paragraph:

- a. Appendix F shows that the Shapiro-Wilk test was used to test for normality, not the Mann-Whitney test. The Mann-Whitney test is not a test for normality. Please revise the document throughout by removing the reference to the Mann-Whitney test.

Chino Response:

Per the response to Comment 20, univariate statistics were removed from the document.

- b. Appendix F tested a 66 sample dataset, yet this section refers to a 61 sample dataset. The tests in Appendix F shall be rerun with the 61 sample dataset that is referred to in this section so that the text and the appendix reflect the same data sets.

Chino Response:

Appendix F contained data and information related to both the univariate and spatial analyses. This appendix was modified to present only information and data related to the spatial analysis. As mentioned in the introduction of this letter, the spatial analysis was rerun using a dataset consisting of 121 samples. Of the 121 samples applied to the spatial analysis, the number of samples used in the analysis of a given constituent varied from 98 to 121 depending on the analytical results available for that constituent.

Comment No. 27:

Section 4.2.3.1, Arsenic within Exposure Area 4, page 4-10, fourth paragraph. It is incorrect to compare the geometric mean of EA 4 dataset to the arithmetic mean of the reference dataset. The same statistic should be used for the comparison in both datasets. Please revise the document as necessary.

Chino Response:

Per the response to Comment 20, univariate statistics were removed from the document. The discussion that compares the data used in the spatial analysis to the reference data was modified to compare median value of the spatial analysis dataset to the reference data.

Comment No. 28:

Section 4.2.3.1, Arsenic within Exposure Area 4, page 4-10, fifth paragraph. Please provide clarification for the statement that arsenic exhibits a "non-normal" distribution. It was previously presented that the arsenic distribution is lognormal. The spatial trend of arsenic with distance from the smelter is evident from Figure 4-12, and is not dependent on the shape of the data distribution. The phrase "a non-normal distribution that is consistent with" shall be removed, and this sentence shall be moved to the next paragraph. This comment applies globally. Please revise the document as necessary.

Chino Response:

Appendix F presents histograms indicate the data for arsenic are log-normally distributed. The text addressed in the comment was unclear because it indicates that the natural log-transformed data are normally distributed. What was meant is that the data are log-normally distributed. The text was clarified.

Comment No. 29:

Section 4.2.3.1, Arsenic within Exposure Area 4, page 4-11, top. The meaning of the last sentence is unclear; please provide clarification for "the 95th percentile...is bounded by the data". This comment applies to all similar sentences about the other contour figures. The 95th percentile for arsenic is 9.4 mg/kg, therefore, 5% of the arsenic data are above 9.4 mg/kg. The contour lines in Figure 4-12 cannot be used to draw conclusions about areas that are above or below a value of 9.4 mg/kg, because none of the contour lines lie on this value. The legend in Figure 4-12 says that the range for the highest concentration (blue contour) goes to 8.96 mg/kg; this is incorrect as there are a number of data points in Figure 4-12 that are above 8.96 mg/kg (e.g., S47 at 13.3 mg/kg). Please revise the legend to reflect this change. The reference to the term "UCL" shall also be removed from this and all similar sentences throughout the report for the reasons stated above.

Chino Response:

The calculation for and the use of the term "UCL" was removed from the report as part of the revised approach to presentation of univariate statistics in the RI Report.

Comment No. 30:

Section 4.2.4, Surface Soil Sampling Results Outside of Exposure Area 4, p. 4-20:

- a. Please provide an explanation of what is meant by "Outside Exposure Area 4". Does this refer to areas covered by the 160 data points, used in the kriging that are outside EA 4 or only to the area outside of EA 4 that is shown in the contour figures (Figures 4-12 to 4-21)?

Chino Response:

The revised RI presents the results surface and shallow soil sampling within all HHRA exposure areas. The text was revised accordingly.

Surface soil samples were identified in the December 22, 2006, Revised Remedial Investigation Report as being located either inside or outside Exposure Area 4 to adhere to the defined exposure area boundaries defined in the Human Health Risk Assessment Work Plan dated July 11, 2005. However, in the re-analysis of the spatial data, additional samples were added to the sample set to improve the quality of the analysis, and the areal distribution of the samples is not strictly limited by the boundary of Exposure Area 4. Accordingly, the distinction between inside and outside the boundary is not indicative of the data usage. The surface soil samples are viewed as a single group with a subset amenable to the spatial analysis. A total of 98 to 121 surface soil sample points were used in the re-analysis of the spatial data, according to the number of results available for a given constituent.

- b. There are not 69 data points shown outside of EA 4 on the contour figures. The contour figures should show all of the data points used in the kriging. The boundaries of the contoured area shall be truncated at the furthest data points used in the kriging; and the contoured area shall not be extrapolated beyond the farthest data points. It appears that there are data points used in the kriging that are not shown on Figures 4-12 to 4-21, and these points help to bound the kriging. Because these points are not shown, it makes the figures appear as if the contours are extrapolated beyond the farthest data point, when in fact the contours are interpolated between known data points. Please revise figures to reflect these comments.

Chino Response:

Chino will revise the figures with an explanation in the legend that the kriged data points shown on the maps extend beyond the area shown on Figures 4-12 to 4-21.

Comment No. 31:

Section 4.2.4.2, Barium Outside of Exposure Area 4, page 4-21: the first paragraph refers to Figure 4-13, but should refer to Figure 4-2. Please revise document.

Chino Response:

Revised as requested.

Comment No. 32:

Section 4.2.4.3, Cadmium outside Exposure Area 4, page 4-22: the 1st paragraph refers to Figure 4-3, but SS116 is not shown on this figure. Please reference Figure 4-14 instead.

Chino Response:

Revised as requested.

Comment No. 33:

Section 4.2.4.3, Cadmium outside Exposure Area 4, page 4-22: SS116 is inside Exposure Area 4 which causes confusion in understanding why the document refers to "inside" and "outside" Exposure Area 4. Please revise.

Chino Response:

See response to Comment Nos. 13 and 20.

Comment No. 34:

Section 4.2.4.6, Lead outside of Exposure Area 4, page 4-23: ERA 162 is not located west of the tailing impoundment. Please revise.

Chino Response:

Text was revised to state that sample was collected east of Bayard.

Comment No. 35:

Section 4.2.4.7, Manganese outside of Exposure Area 4, page 4-23: SS105 is not located west of the tailing impoundment. Please revise.

Chino Response:

Text was revised to state that sample was collected north of Hurley.

Comment No. 36:

Section 4.2.4.8, Molybdenum outside Exposure Area 4, page 4-24: SS127 is not located west of the tailing impoundment. Please revise.

Chino Response:

Revised text to state that sample was collected east of the tailing impoundment.

Comment No. 37:

Section 4.2.4.9, Selenium outside of Exposure Area 4, page 4-24: SS145 is not located west of the tailing impoundment. Please revise.

Chino Response:

Text was revised to state that sample was collected east of the tailing impoundment.

Comment No. 38:

Section 4.2.5, Sediment Sampling Results, page 4-25: please revise this Section stating which samples were collected in the stock ponds.

Chino Response:

The samples associated with the stock ponds were labeled SWS-1 through SWS-6.

Comment No. 39:

Section 4.2.5, Sediment Sampling Results, page 4-25: Please revise the text to indicate that the sediment samples from areas other than Bolton Draw will be used in the ERA as well as the HHRA.

Chino Response:

Text was revised as requested.

Comment No. 40:

Section 4.2.6, Surface Water Sampling Results, page 4-27: please add a reference for SWER-State of New Mexico Standards for Interstate and Intrastate Surface Waters, 20.6.4 NMAC, July 17, 2005. Update other sections of the document as appropriate.

Chino Response:

The reference was added as requested, both in the text and in the reference section.

Comment No. 41:

Section 4.2.7.1, Smelter Area, page 4-31, first paragraph: this Section refers to Figure 4-33, but should refer to Figure 4-34. Please revise.

Chino Response:

Figure 4-35 was incorrectly labeled as Figure 4-33. Figure 4-33 (West smelter boundary surface soil results for copper) is the correct figure. The figure number for Figure 4-35 was corrected.

Comment No. 42:

Section 4.3, Historical Conceptual Site Model Validation, page 4-40: this Section refers to Figure 4-34, but should refer to Figure 4-35. Please revise.

Chino Response:

As in the previous response, Figure 4-34 is the correct figure (Conceptual site model for historic sources). It was labeled incorrectly as Figure 4-35. This error is now corrected.

Comment No. 43:

Section 4.3.2, Historical Release Mechanisms, page 4-40: this Section refers to Figure 4-34, but should refer to Figure 4-35. Please revise.

Chino Response:

As in the previous response, Figure 4-34 is the correct figure (Conceptual site model for historic sources). It was labeled incorrectly as Figure 4-35. This error is now corrected.

Comment No. 44:

Section 4.4.1, Surface Soil, page 4-41: the text states that the maximums were compared to the decision criteria (SSLs). Please revise. Table 4-19 listing the maximum detected concentrations, not the UCL or 95th percentile values. The maximum detected concentrations shall be compared to the decision criteria (SSLs). The max value shall be bolded if it exceeds at least one decision criteria (SSL).

Chino Response:

The table was revised as requested.

Comment No. 45:

Section 4.4.1, Surface Soil, page 4-42: the first full paragraph states "... the measured arsenic concentrations are comparable with the established reference concentration for the area." This is not demonstrated in Table 4-8. Please revise this statement as appropriate.

Chino Response:

The text was edited to delete this statement.

Comment No. 46:

Section 4.4.2, Sediment, page 4-43: The 1st full paragraph on page 4-43 states that the maximums were compared to the decision criteria (SSLs), but then states that the UCL and 95th percentiles exceeded the decision criteria (SSLs). Table 4-21 shall list the maximum detected concentrations, not the UCL or 95th percentile values. The maximum detected concentrations shall be compared to the decision criteria (SSLs). The maximum value shall be bolded if it exceeds at least one decision criteria. Please revise as necessary.

Chino Response:

The text was edited to compare maximum concentrations to SSLs. All references to univariate statistics were deleted.

Comment No. 47:

Section 4.4.2, Sediment: add language in this Section explaining that sediment concentrations were compared to EPA SSLs because sediment screening levels have not been established.

Chino Response:

The following text was added as requested:

"Sediment concentrations were compared to EPA SSLs because sediment screening levels have not been established."

Comment No. 48:

Section 4.4.2, Sediment, page 4-43: the last paragraph of this Section refers to Figure 4-35, but should refer to Figure 4-33. Please revise.

Chino Response:

As in Responses 41 through 43, Figure 4-35 is the correct figure (Vertical profiles of sediment results for test pit locations). It was labeled incorrectly as Figure 4-33. This error is now corrected.

Comment No. 49:

Section 4.4.3, Surface Water, page 4-43: the second bullet refers to 20.6.4.900 NMAC, Part M. The correct reference is 20.6.4.900, Part I and J, amended July 17, 2005.

Chino Response:

The correction was made to reference 20.6.4.900, Part I and J

Comment No. 50:

Section 4.4.4, Groundwater, page 4.43: This Section is incomplete; the document states that existing groundwater data are inconclusive to assess potential adverse impacts to groundwater. However, no groundwater data are presented (EPA SC-3). Although groundwater issues will be investigated under the site Discharge Plans, please provide the data in this document which was submitted to Gradient Corporation for use in the Human Health Risk Assessment.

Chino Response:

The groundwater data submitted to Gradient Corporation will be provided as an appendix to the RI Report.

Comment No. 51:

Section 4.4.5, Nature and Extent, page 4-44: The text does not answer the question posed by the bullet. Figure 4-16 (copper concentration contours) shows the samples and concentrations for S59, S60, S62, and S63, but does not show the highest concentration sample, S61. Please provide the rationale for why these five samples were not included in the kriging that produced the contours in Figure 4-16. The fact that the area around these five samples in Figure 4-16 is not colored red is misleading; all areas above 5000 mg/kg should be red on Figure 4-16. The upper end of the concentration range for the red box in the legend (8122 mg/kg) is not correct. There are currently concentrations up to 12,100 mg/kg in the red zone on this figure. Please correct the contour figures for all elements, or the legend for the highest concentration color should simply say "greater than" some value.

Chino Response:

See Comment No. 18c. Analytical data from soil samples S59 through S63 indicate elevated constituents within the historic operational area of the smelter. The data correlate to former material handling areas which will be subject to reclamation under MMD and NMED standards. Data were collected to characterize the historic source area for the Hurley Soils IU. Therefore, these data are not representative of current or future residential exposure because remediation will take place under DP-1340 before any future change in property use. Contours shown in Figure 4-16 represent comparable data points for current or future residential exposure areas. Data values for soil samples S59 through S63 will be posted on the figure; however, additional contouring to include these data points is inappropriate. Therefore, constituent data within the historic smelter operational area will be posted and contour shading will be modified to minimize potential for incorrect interpretation.

Comment No. 52:

Section 4.4.5, Nature and Extent, page 4-44: the last paragraph refers to Figure 4-33, but should refer to Figure 4-34 (EPA SC-4). Please revise.

Chino Response:

As in Response 48, Figure 4-33 (West smelter boundary surface soil results for copper) is the correct figure. Figure 4-35 was incorrectly labeled as Figure 4-33. The figure number for Figure 4-35 was corrected.

Comment No. 53:

Section 5.0, Risk Assessment, page 5-1: Please add that the HHRA and ERA (both Site-wide and IU specific) are being directed by the NMED and will be reported in separate documents (EPA SC-5).

Chino Response:

The following text was added to the introductory paragraph in Section 5.0: "The risk assessments (both site-wide and IU-specific) are being directed by the NMED. The Site-Wide ERA was completed (NewFields, 2006). The draft IU-specific ERA was submitted in July, 2007 (Newfields, 2007)."

Comment No. 54:

Section 5.1, Ecological Risk Assessment, page 5-1: The Site-wide Ecological Risk Assessment was finalized in February 2006. The potential for risk to terrestrial and aquatic receptors on a site-wide basis, including some areas of the S/TSIU, was extensively discussed in that document. Please revise this Section to include a summary of the results and conclusions presented in that document and indicate that an ERA specific to the S/STIU, including the results of the supplemental sampling, is pending.

Chino Response:

A summary of the Site-Wide ERA was added to Section 5.1.

Comment No. 55:

Section 5.1, Ecological Risk Assessment, page 5-1: In the second to last sentence, it states that there are 6 additional "reference" soil samples located west of the tailing pond. It is not clear the locations of the 6 samples. Please clarify where and when these samples were collected (EPA SC-6).

Chino Response:

The 6 additional samples referenced in the text were intended to improve the characterization of nature and extent in shallow (0-6") soils for the Ecological Risk Assessment. The text has been revised accordingly.

Comment No. 56:

Section 5.2, Human Health Risk Assessment, page 5-1: The procedures and decision criteria (SSLs) discussed here are not consistent with Gradient's Human Health Risk Assessment Work Plan for the S/TSIU. Gradient performed a screening of the data to determine COCs to be used in the risk assessment. Gradient used maximum detected concentrations for the screening and compared to screening criteria that were the lower of either the Medium-Specific Screening Level (MSL) or the EPA Region 9 PRG (see Section 2.3 of the HHRA work plan) (EPA SC-7).

Please add the following sentence after the first sentence of the bullet at the bottom of the page to read:

"The constituents of potential concern are selected through a screening process based on a direct comparison of measured concentrations of all constituents in various site media to conservative federal/state numerical regulatory standards and criteria; calculated risk-based screening levels, or commonly accepted benchmarks approved by EPA for screening purposes."

Chino Response:

The new text was added to Section 5.2 as suggested.

Comment No. 57:

Section 5.2, Human Health Risk Assessment, page 5-1: please delete the last two (2) sentences at the bottom of page 5-2 and all of page 5-3. Additionally, remove Figure 5-1 from the document (EPA GC-1 & SC-8).

Chino Response:

The text has been deleted as requested, and Figure 5-1 has been removed from the report.

Comment No. 58:

Section 6.0, Summary and Conclusions, page 6-1: this subsection is inadequate and needs to be revised to include the findings of the RI (i.e., compare constituent results with background, decision criteria (SSLs) for soil and ARARs, such as surface water criteria) (EPA SC-9a).

Chino Response:

Chino concurs with the recommendation and the text will be amended to include additional comparison of constituent results with decision criteria.

Comment No. 59:

Section 6.2, Feasibility Study, page 6-1: please revise the title (i.e., "Next Steps" or "Future Work") and this subsection to include additional sampling requirements to fill data gaps (i.e., surface water copper issue) and other documents such as the FS (EPA SC-9b).

Chino Response:

The section is now titled "Future Work" and sentences have been added at the beginning stating:

"Future work will include additional sampling to fill data gaps. A surface water sampling event was conducted in September 2007. A report of the findings and a presentation of the results will be submitted to NMED as a technical memorandum in support of the Smelter/Tailings Soils IU RI Report. The feasibility study that follows the RI utilizes the data and findings therein."

Comment No. 60:

Section 6.2, Feasibility Study, page 6-1: please revise the first bullet to read "~~Establishment of~~ RACS Develop remedial action objectives (RAOs) for constituents and media of interest, exposure pathways and RAC that permit a range of alternatives to be developed. These ~~criteria~~ RAOs are developed based on the findings of the HHRA, chemical-specific Applicable Standards (applicable or relevant and appropriate requirements or ARARs), when available, and the Site-Wide (EPA SC-9c).

Chino Response:

The 2 sentences were revised as edited in the comment.

Comment No. 61:

Section 6.2, Feasibility Study, page 6-1: please revise the second bullet to read “~~Identification of the applicable~~ *Develop* general response actions for each medium of interest defining containment, treatment, excavation or other actions that may be taken to satisfy the RAOs for the site (e.g., institutional control, surface reclamation or soil removal)” (EPA SC-9d).

Chino Response:

The bullet was revised as edited in the comment.

Comment No. 62:

Section 6.2, Feasibility Study, page 6-1: please revise the last bullet to include the following statement at the end of the bullet (EPA SC-9e):

“During this detailed analysis, each alternative is assessed against the nine evaluation criteria which have been developed to address statutory requirements of CERCLA. The nine evaluation criteria with the associated statutory considerations are:

- 1. Overall protection of human health and the environment*
- 2. Compliance with ARAR's*
- 3. Long-term effectiveness and permanence*
- 4. Reduction of toxicity, mobility, or volume*
- 5. Short-term effectiveness*
- 6. Implementability*
- 7. Cost*
- 8. State acceptance*
- 9. Community acceptance”*

Chino Response:

The bullet was revised with the addition of the above statement.

Comment No. 63:

Table 3-2: the Table provides ecologically-based DQOs for the sediment pathway only. DQOs based on potential ecological exposures for the shallow soil and surface water pathways shall also be provided. In addition, all references to the Site-wide Ecological Risk Assessment shall be updated to indicate that the document is no longer a draft.

Chino Response:

The DQOs for shallow soil and surface water pathways were added to Table 3-2. The text was updated as requested to reference the Site-Wide Ecological Risk Assessment as final.

Comment No. 64:

Table 4-2:

- a. Please review iron values as several values are incorrectly formatted (BOLD) regarding values that exceed criteria (SSLs).

Chino Response:

The corrections were made to Table 4-2.

- b. Please add the lead soil screening level to the Table.

Chino Response:

The lead soil screening level was added to Table 4-2.

Comment No. 65:

Table 4-8: please add an "Arithmetic Mean" column for "Western U.S. Soils".

Chino Response:

The column was added as requested.

Comment No. 66:

Table 4-10 & 4-11: please add the lead soil screening level to the Tables.

Chino Response:

The lead screening level of 400 mg/kg was added to both of the tables.

Comment No. 67:

Table 4-12: please add a screening value column which lists the New Mexico Water Quality Control Commission standards.

Chino Response:

A column for the NMQCC standards for domestic water supply was added to the table.

Comment No. 68:

Table 4-13: Please add a column for acute and chronic aquatic surface water criteria from 20.6.4.900:I. & J. NMAC and a note at the bottom of the table. These criteria require the calculation of "Hardness" prior to calculating the specific criteria. Please provide the "Hardness and criteria calculations" in an Appendix.

Chino Response:

The acute and chronic aquatic surface water criteria were added to Table 4-3. The Hardness-based criteria calculations were added as the new Appendix G.

Comment No. 69:

Table 4-14: please define superscript (1) in the "Parameter" column or eliminate as appropriate.

Chino Response:

Added footnote: ⁽¹⁾ EPA Region 6 human health medium-specific screening level, 2007, for residential water.

Comment No. 70:

Table 4-15: please edit the title by replacing "Hearly" with "Smelter".

Chino Response:

With the decommissioning of the smelter in 2007, the Smelter Operations Area was renamed the Hurley Operations Area. The spelling error will be corrected.

Comment No. 71:

Table 4-18: please revise the title to read "Univariate statistics for shallow soil samples collected for Ecological Risk Assessment."

Chino Response:

The table will be re-named "Summary of Shallow Soil Samples Collected for Ecological Risk Assessment". As described in an earlier comment, the table will have the univariate statistics removed, with the exception of minimum, maximum, and median values.

Comment No. 72:

Table 4-19: please provide an explanation why only samples S1-S58 data are reported on this table.

Chino Response:

The table was amended to include all surface soil samples.

Comment No. 73:

Table 4-21: please add the lead soil screening level to the Table.

Chino Response:

The lead soil screening level was added to the table.

Comment No. 74:

Table 4-22: please add all contaminants of concern to table as listed in Table 4-13.

Chino Response:

All contaminants of concern were added to the table.

Comment No. 75:

Table 4-22: the SWER criteria for human health are incorrect, with the exception of thallium. Please update the SWER column with correct standards listed in 20.6.4.900 NMAC Part I and J (July 17, 2005) and correct the note to reflect this change.

Chino Response:

The corrections were made to Table 4-22.

Comment No. 76:

Table 4-22: please add column(s) to this table or other table(s) for all other routes of exposure (i.e., aquatic life) with corresponding standards.

Chino Response:

Standards for acute and chronic aquatic life were added to Table 4-22 and Table 4-13.

Comment No. 77:

Table 6-1: please revise this Table to include the S/TSIU ERA as part of the FS schedule presented in this Table.

Chino Response:

The S/TSIU ERA was added to the table, under the date guidelines completion is indicated in July 2007.

Comment No. 78:

Figures 3-1, 3-2 and 3-3: please add these figures to the document.

Chino Response:

The missing figures were added back into the revised RI report.

Comment No. 79:

Figure 3-5: Samples SED10 and SW10 were collected adjacent to ERA 164 in lower Rustler Canyon. Please revise the Figure accordingly. Also, annotate the figure to show exposure areas.

Chino Response:

The samples locations were moved to their correct positions in lower Rustler Canyon on the figure. The figure will also include exposure areas.

Comment No. 80:

Please add a figure showing soil pH.

Chino Response:

A figure showing the posted values of soil pH was added.

Comment No. 81:

Figure 4-35: please include the pathway numbers from Section 4.4 on this figure.

Chino Response:

Pathway numbers were added as requested.

Comment No. 82:

Appendix D, Section 1, Introduction: revise this Section to include the samples collected in 2006.

Chino Response:

Appendix D is comprised of Data Validation Reports for both the 2004 and 2006 sampling events and comprises 813 pages. Validation of the data collected in 2004 data is presented in pages 3 through 451. Validation of the data collected in 2006 follows on 452 through 813. Each validation report needs to remain independent. However text in the preface of the Appendix D was added to explain the layout of the documents and where the text for each is found.

Comment No. 83:

Appendix D, Section 5.15.3, Holding Times, page 5-76: revise this section with regards to past pH; these are not soil samples.

Chino Response:

The first sentence in Section 5.15.3 has been modified to remove reference to paste pH.

Comment No. 84:

Appendix F: The datasets used in the Appendix F summary statistics do not have the same number of samples as shown in Table 4-7 (61 samples) or Table 4-9 (69 samples), or a

combination (130 samples). On pages 3 to 28 of Appendix F, N = 66 samples. Please provide information on what data set this represents. Appendix F shall list the samples that are included in the 66 sample dataset, their depths, and what area this dataset covers. Please provide information on how the statistics for the 66 sample data set in Appendix F relate to the datasets shown on Tables 4-7 and 4-9.

Chino Response:

As noted in the response to Comment 26, the spatial analysis now includes a total of 121 samples. Appendix F presents the evaluation of the use of those data in the spatial analysis, and presents the associated variograms. All samples used in the spatial analysis are surface soils at 0-1" in depth. The number of samples presented in Appendix F is consistent with the tables and text.

Comment No. 85:

Appendix F: The Shapiro-Wilk test of normality was done on the log-transformed dataset for each element (p. 3 to 28). The Shapiro-Wilk test reports a test statistic and a p-value. If the p-value is less than 0.05, then the data are considered normally distributed. In this case, since log-transformed data were used in the Shapiro-Wilk test, a p-value less than 0.05 indicates that the data are lognormally distributed. The results of the Shapiro-Wilk test shall be summarized in a table that shows for each element, the number of samples, the p-value for the test, and whether the test shows that data are lognormally distributed. Please revise as necessary.

Chino Response:

Appendix F was updated to include evaluation for normality as part of the validation testing of the spatial analysis. The Shapiro-Wilk tests presented on pages 3-28 of Appendix F were removed.

Comment No. 86:

Appendix F: In many cases, the results of the Shapiro-Wilk test seem to be inconsistent with the graph of normal quantile (z-score) vs. LN(concentration) shown on each page. Graphs that show a decent fit of the data to the regression line may have a p-value for the Shapiro-Wilk test that is much higher than 0.05 (e.g., arsenic, page 4, p-value = 0.86), and graphs that show a poor fit of the data to the regression line may have a p-value much lower than 0.05 (e.g., boron, page 8, p-value <0.0001). Please verify the results by performing this test with EPA's Pro-UCL program, which indicates if the data are normal, lognormal, or neither.

Chino Response:

As mentioned in the response to the previous comment, Appendix F was updated to include evaluation for normality as part of the validation testing of the spatial analysis. The Shapiro-Wilk tests presented on pages 3-28 of Appendix F were removed.

Comment No. 87:

Appendix F: Please clarify if conclusions about outliers were drawn from the box plots presented on pages 3 to 28. Also explain why the box plots are presented.

Chino Response:

The univariate statistics presented on pages 3 to 28 of Appendix F were removed from the document.

Comment No. 88:

Appendix F (and Section 4.2.2): please revise to clearly explain the datasets used for each analysis. Page 4-6 states that 160 samples were used in the geostatistical analysis, yet in Appendix F, the number of data points varies by element. Copper (p. 37) has 97 data points used for the variogram, arsenic has 94 points, barium has 99 points, *etc.* If the kriging was done on 160 samples, please explain why there aren't 160 samples in the variograms in Appendix F. Also, please provide the raw data used for the geostatistics in Appendix F.

Chino Response:

The datasets used for each analysis were described in Section 4.2.2 of the text, and summarized on a table in Appendix F. Also provided in the appendix are the raw data used in the spatial analysis.

Comment No. 89:

Appendix F: please provide in each model evaluation report a cross-validation plot (*i.e.*, a plot of "Kriged Value" vs. "Assay Value" to illustrate the "goodness of fit") obtained using the variogram model. Cross-validation provides a quantitative measure of the "goodness-of-fit" of the chosen variogram model to the actual data. Cross-validation involves kriging the data many times using the chosen variogram model, each time with a different point removed. Hence, a dataset including kriging estimates and actual values at each location is obtained. A linear regression of estimated vs. actual values provides an r^2 value, which gives an idea of the predictive value, or "goodness-of-fit" of the variogram model.

Chino Response:

As requested by NMED, graphs were provided to illustrate the correlation between "Kriged Value" and "Assay" value. As stated by NMED, the correlation coefficient, r^2 , provides a useful metric by which to evaluate the "goodness-of-fit" of the variogram model. However, model validation was performed not only to determine "goodness-of-fit", but to ascertain the validity of model assumptions. The results of the validation procedure are provided in Appendix F. Each spatial model was evaluated with respect to the following six criteria:

- 1. Average kriging error should be close to zero.*
- 2. Root-Mean-Square Error (Std Deviation of kriging errors) should be lower than the Std Deviation of the regionalized variable.*
- 3. Kriged Reduced RMS Error (Std deviation of standardized error) should be close to unity (*i.e.* - in the interval 1.00 plus or minus $2\sqrt{2/n}$) (Delhomme, 1978, p 258).*
- 4. The Standardized Errors should be independent of the kriged (estimated) values.*
- 5. The Standardized Errors should be independent of sample coordinates.*
- 6. Kriged values should be positively correlated with observed values of the regionalized variable. High correlations are desirable but the preceding criterion must be met.*

Examples of cross-validation for arsenic and copper are below. These were produced by Gradient Corporation (HHRA contractor) from the model validation results in Appendix F. Cross-validation plots for arsenic and copper indicate R^2 values of 0.32 and 0.61, respectively. This indicates that the variogram for copper has a better fit to the data (higher R^2) than the one for arsenic. Please provide plots should be done for all of the elements. Table 4-5 shall list the cross-validation R^2 value for each variogram for each element.

Overall, there are varying degrees of spatial correlation for the different elements, and the variability of the data is generally high (as indicated in the text). The high degree of variability in the concentration data means that although geostatistics may provide the most accurate contouring of the data, there is still a fair amount of uncertainty in the contours. The uncertainty in the contours is not discussed in the RI report, and is not readily apparent from the information presented in this report. Either the RI report or the Feasibility Study shall include more information about the uncertainty in the contours, because this may influence how the contours will be used to support cleanup decisions.

The results of the geostatistical analysis can provide estimates of uncertainty for each grid point. One way to show uncertainty is to use the results of the kriging to generate a contour map that shows the probability of exceeding (or being below) a threshold concentration (such as a cleanup level).

With regard to the estimation of uncertainty, the objective of the RI geostatistical analysis was to provide the best possible estimates of mean concentration and to provide useful information on variance. During the feasibility study, more attention will be given to the quantification of uncertainty because estimated concentrations will be used to support cleanup decisions. Sampling and analytical procedures will be designed to provide this information. At this point, the most meaningful metric we can provide is the probability of obtaining a sample with a concentration exceeding a specified threshold concentration.

In response to NMED's final comment to the RI, indicator kriging was performed to determine the probability of obtaining a composite sample (collected in accordance with the Field Sampling Plan) with a copper concentration greater than the proposed cleanup level of 5000 mg/kg. Figure 4-16 depicts the 5 percent probability contour. Indicator kriging was not performed for other constituents because all measured concentrations for these constituents are below action levels.